

IN THE CLAIMS:

1. (Withdrawn) A process for forming bonded cellulosic microfibers nonwovens comprises the steps of

(a) extruding a cellulose solution (dope) through a concentric melt blown spinneret with a plurality of spinning nozzles

(b) drawing each individual extrudate filament to fine fiber diameter by its own air jet

(c) coagulating and entangling the fine fibers with a series of pressured hydro needling jets of recycling solution of the mixture of cellulose solvent and non-solvent in the spin-line

(d) collecting the stream of microfibers air and needling jets on a moving collecting surface to form cellulosic fiber web

(e) hydro-entangling the said pre-bonded web downstream with at least one set of hydro needling jets of recycling solvent/non-solvent solution for forming well bonded nonwoven web

(f) regenerating the fine fibers in at least one bath for at least 5 seconds

(g) further regenerating and washing the fine fibers in another bath for at least 5 seconds

(h) pinching the well bonded melt blown cellulosic nonwoven with pressure rollers to remove major portions of the non-solvent.

(i) drying the nonwoven web by heat or vacuum or both and

(j) winding the nonwoven web into rolls.

2. (Withdrawn) The process of claim 1 in which the spinning nozzles are arranged in at least one row with a nozzle-to-nozzle space of 0.050" to 1.000"

3. (Withdrawn) The process of claim 1 in which the spinning nozzles are 0.005" to 0.050" in inside diameter and 0.500" to 3.000" in length.

4. (Withdrawn) The process of claim 1 in which the spinning nozzles are concentric with their individual gas holes and protruded -0.005" to 0.800" from the top plate of the said gas holes.

5. (Withdrawn) The process of claim 1 in which the solvent of the cellulose solution is one or more of the following: NMMO dilute caustic soda phosphoric acid mixture of liquid ammonia/ammonia thiocyanate and others.

6. (Withdrawn) The process of claim 1 in which the non-solvent of cellulose is one or more of the following: water alcohol ($C_nH_{2n+1}OH$ $n \leq 10$) and/or water/alcohol/solvent solutions

7. (Withdrawn) The process of claim 1 in which the recycling solvent/non-solvent solution is filtered and supplied from the regenerating bath by a high pressure pump and part of the solution is continuously removed from the said bath for solvent recycling.

8. (Withdrawn) The process of claim 1 in which the recycling NMMO solution is supplied to the needling jets from and come back to the first regenerating bath. The second washing bath is continuously filled with fresh non-solvent which is sprayed onto the nonwoven

web first. Part of the low concentration solution continuously overflow from the washing bath to the regenerating bath.

9. (Currently amended) ~~The~~ A collecting system for manufacturing ~~the said~~ cellulose fiber nonwoven ~~comprises~~ comprising:

(a) a paternally perforated drum with a diameter ranged from 20 inch to 70 inch;

(b) at least one set of coagulating hydro needling ~~jets~~ jet heads from each of which are are expressed hydro jets which jets contact the ~~contacts with flying fibers~~ 0.5 inch to 30 inch from the collecting surface and at an angle from 5 degree to 75 degree (relative to the ~~air blowing~~ direction of movement of the jets);

(c) at least another set of hydro needling ~~jets~~ jet heads downstream from the at least one set for both hydro-entangling and fiber regenerating;

(d) at least one regenerating bath and one washing bath with conveying belts;

(e) at least one vacuum section across and beneath the drum surface;

(f) at least one heating section across and above the drum surface.

10. (Currently amended) The collecting system of claim 4-9 in which the regenerating and washing ~~baths~~ baths contain a series of rollers to guide ~~the a~~ nonwoven web being formed on the conveying belts.

11. (Currently amended) The ~~conveying belt~~ collecting system of claim 9 wherein the collecting drum rotates at a certain surface speed and wherein the conveying belt is submerged in both bathes and moves slower than surface speed of the collecting drum.

12. (Withdrawn) The cellulosic nonwovens of claim 1 in which the fibers are essentially continuous with an average size of 1 to 30 micrometer in diameter and bonded by both self-bonding and hydro-entanglement.

13. (New) The collecting system of claim 9 wherein the jet heads are arranged in at least one row with a nozzle-to-nozzle space of 0.050" to 1.000"

14 (New) The collecting system of claim 9 wherein the jet heads are 0.005" to 0.050" in inside diameter and 0.500" to 3.000" in length.

15. (New) The collecting system of claim 9 wherein the jet heads protrude through gas holes in a top plate and are concentric with their individual gas holes and protrude -0.005" to 0.800" from the top plate.

16. (New) The collecting system of claim 9 wherein the cellulose is supplied in a form dissolved in a solvent and wherein the solvent is selected from the following: NMMO; dilute caustic soda; phosphoric acid; mixture of liquid ammonia/ammonia thiocyanate.